Malnutrition in infants receiving cult diets: a form of child abuse

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Summary and conclusions

Severe nutritional disorders, including kwashiorkor, marasmus, and rickets, were seen in four children and were due to parental food faddism, which should perhaps be regarded as a form of child abuse. All disorders were corrected with more normal diets and vitamin supplements.

In view of the potentially serious consequences of restricted diets being fed to children, families at risk should be identified and acceptable nutritional advice given. When children are found to be suffering from undernutrition due to parental food faddism a court order will normally be a necessary step in providing adequate treatment and supervision.

Introduction

Interest is growing in cult diets that are largely or wholly vegetarian. The children of adherents to such diets may be at risk of nutritional disorders.[1 2] Vegetarian mothers usually breast-feed their infants, often for prolonged periods, but on weaning a vegetarian diet may be given. Children reared in this way have depressed growth rates up to the age of 2 years,[3] suggesting suboptimal nutrition. Severe nutritional problems have been reported from the United States in children given strict vegetarian (vegan) diets or the even more restricted extreme Zen macrobiotic diets,[4 5] which largely consist of cereals.

We present case reports of four children with serious nutritional disorders who were fed cult diets, and we suggest guidelines for managing this problem.

Case reports

CASE 1

This 13-month-old boy was admitted to hospital with malaise and swollen ankles. His parents were converts to a cult whose main tenet was adherence to an uncooked, restricted vegetable diet. Since birth the child had received only breast milk and uncooked fruits and vegetables; he had not received any cereals or legumes. On examination he was unwell, extremely anaemic, and lethargic and had generalised wasting, fine sparse hair, glossitis, angular cheilitis, and pitting oedema of the feet. His weight (6·37 kg) and length (70 cm) were below the third centile. As his parents refused to permit investigations and to implement an adequate diet a place of safety order was taken out and he was admitted to hospital. Investigations confirmed kwashiorkor and severe anaemia. His serum albumin concentration was 14 g/l (1·4 g/100 ml) and haemoglobin 4·7 g/dl. His blood film and bone marrow were megaloblastic, and vitamin B_{12} was not detectable in serum. Serum iron concentration was 9·3 μmol/l (52 μg/100 ml); red blood cell count and serum folate concentration were normal. He was hyponatraemic, with a plasma sodium concentration of 129 mmol(mEq)/l. Plasma concentrations of vitamins A and E and the prothrombin time were all normal. Skeletal survey showed osteoporosis but no changes of rickets.

Because of the nature of his diet an accurate dietary assessment was impossible, but it was clearly deficient in protein, calories, iron, and B_{12}. The parents and a four-year-old male sibling had also followed an uncooked vegetable diet for at least one year. His mother had low serum B_{12} (105 ng/l) and serum iron (13·7 μmol/l (76·5 μg/100 ml)) concentrations, but all other investigations in the family were normal. After admission to hospital the boy received a small blood transfusion, iron supplements, and full vitamin replacements. His parents refused a normal weaning diet, and after lengthy consultation with the hospital dietitian a balanced cooked vegetarian diet was mutually agreed. He improved with this and gained weight. A series of interim care orders were taken out, after which a supervision order was issued and he was discharged home.

At the age of 2 years he was well and his weight (11·05 kg) and height (81 cm) were within normal limits. Blood count and serum albumin, folate, and B_{12} concentrations were also within normal limits. He remained on a vegan diet, and the supervision order was maintained.

CASE 2

This boy was initially breast-fed, but at the age of 4 weeks was started on a macrobiotic infant food known as kokoh, which consists of rice, wheat, oats, bean, and sesame flour. His father was a vegetarian, and his mother followed a macrobiotic diet. At the age of 9 weeks he became sleepy and reluctant to feed and developed swelling of his face and limbs; he was admitted to hospital as an emergency. On examination (fig 1) he was emaciated and had facial and peripheral oedema. Rectal temperature was 29·4°C. His weight (3·25 kg) and length (54 cm) were well below the third centile. Investigations showed a plasma sodium concentration of 114 mmol(mEq)/l and

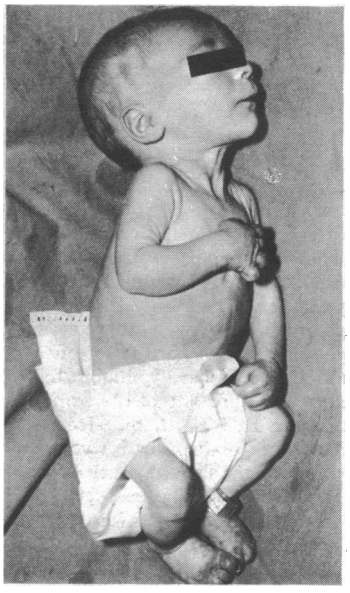

FIG 1—Case 2. Nine-week-old boy fed on kokoh, showing emaciation and facial and peripheral oedema on admission to hospital.

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Dietary intake of boy aged 9 weeks on admission to hospital while taking kokoh (case 2), and recommended intake

	Energy (kcal)	Protein (g)	Carbohydrate (g)	Fat (g)	Sodium (mmol)
Intake/kg body weight/day	52	1·3	9	0·6	0·7
Recommended intake/kg body weight/day	100-130	2-3	10-12	4-5	1·0-2·5

Conversion: SI to traditional units—Energy: 1000 kcal ≈ 4·18 MJ. Sodium: 1 mmol = 1 mEq.

urea concentration of 7·0 mmol/l (42 mg/100 ml), but full blood count and blood sugar, albumin, total serum protein, and plasma potassium concentrations were all normal.

He was gradually rewarmed and given intravenous dextrose and electrolytes. Severe bronchopneumonia developed the day after admission but this gradually responded to treatment with gentamicin. During the first 48 hours after admission he had generalised fits (which were abolished with diazepam) and became hypoglycaemic (blood sugar concentration < 1 mmol/l (< 18 mg/100 ml)). This was corrected with 20% dextrose. Initially the plasma sodium concentration remained low, but it gradually rose to within normal limits by the 11th day, when the oedema disappeared. By this time he was established on a standard infant feed. The table shows a dietary assessment on admission while he was taking kokoh. He gained 1·5 kg in the five weeks after admission. During this period his mother became increasingly worried that he was becoming too fat and declared that she would resume his macrobiotic diet on discharge. After consultation, application was made to the juvenile court and a supervision order was granted. Once this was obtained a compromise diet consisting of milk, rice, and vegetables was agreed with the parents, and he was discharged.

Subsequent growth and progress were satisfactory. At the age of 8 months catch-up growth was almost complete and development normal.

CASE 3

This girl, whose parents adhered to a macrobiotic diet, was weaned at 5 months on to a diet of kokoh, vegetables, and brown rice. When the child was 10 months old the family moved into our area. Shortly after this they were visited by the health visitor, who noted that the child was on a vegetarian diet and strongly advised against it, giving dietary advice that was subsequently ignored. On a repeat home visit the mother was persuaded to take the child to hospital. She was then 12 months old and on examination was small and wasted, her weight (5·0 kg) and length (62 cm) being well below the third centile. A rickety rosary and some wrist thickening were evident, together with developmental delay. Admission for treatment was advised but refused. A place of safety order was therefore taken out and the child detained in hospital. Radiological and biochemical investigations confirmed the presence of rickets.

While on the ward she was fed a normal toddler diet and treated with vitamin D. Other vitamin supplements were also given. During the four weeks in hospital her rickets healed, she gained 0·6 kg, and her rate of development accelerated. A supervision order was obtained from the juvenile court, and she was allowed to go home to her parents, where she received a diet containing goats' milk, fish, and cereals, with vitamin supplements.

She was followed up regularly and was showing catch-up growth and making good developmental progress.

CASE 4

This girl aged 6 months was referred from a psychiatric unit at which her mother had presented with a delusional puerperal psychosis. Both parents adhered to the macrobiotic diet and philosophy. Although partially breast-fed, from the age of 4 months she had been fed mainly on kokoh. On examination she was hungry and wasted with virtually no subcutaneous fat (fig 2, left). Her weight (4·40 kg) was well below the third centile, and her length was 64 cm (third centile). In hospital she was fed on a standard infant milk and a mixed toddler diet. She gained weight rapidly, putting on 2·1 kg in the nine weeks for which she was an inpatient (fig 2, right). The maternal psychosis responded well to treatment, and the parents subsequently complied fully with nutritional advice from a paediatrician and dietitian. At the age of 15 months catch-up growth was complete and she was developing normally.

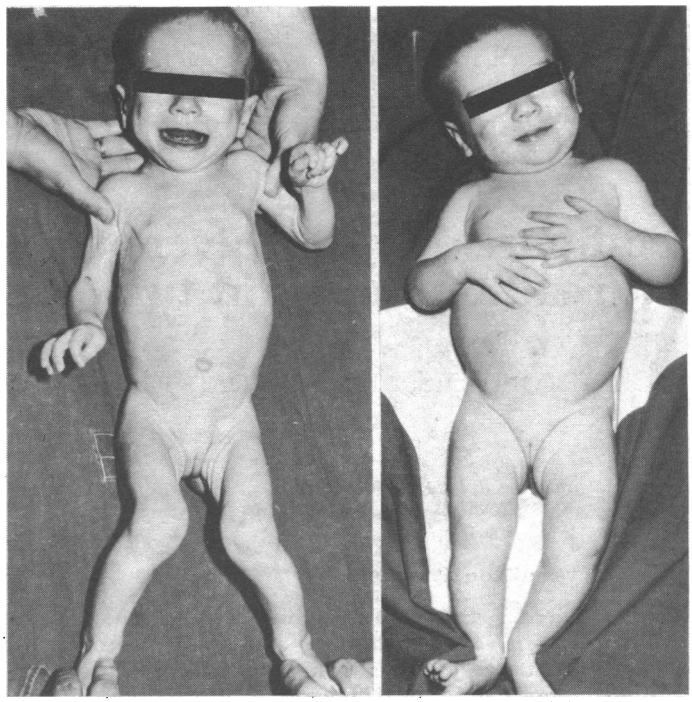

FIG 2—Case 4. Left: 6-month-old girl on admission after having been fed mainly on kokoh for two months. Right: same girl in hospital several weeks later, having been fed on infant milk and a mixed toddler diet and having gained about 2 kg.

Discussion

The four cases described here exemplify the grave nutritional consequences of some cult diets when fed to children, which must be regarded as a form of child abuse. Previous reports of malnutrition from such diets have been confined to the United States,[4 5] but evidently the problem also exists in Britain. Infants are particularly at risk from nutritionally inadequate diets because of the high nutritional needs associated with their rapid growth rate. Those who are breast-fed may be protected in their first months, but when they are weaned on to deficient diets they may become seriously malnourished within weeks. Vegan and the more extreme macrobiotic diets are obviously inadequate for growing children, with deficiencies of total energy, suitable protein, fat-soluble vitamins, and some minerals. Kokoh in particular is obviously unsuitable as a major dietary constituent for infants.

Parental food faddism usually results from sincerely held beliefs, which are unlikely to be greatly modified by medical or dietary advice. Zealous adherents of an extreme faddist diet are often critical of orthodox medicine and may be mentally ill. Their children are at risk of malnutrition. If women are identified as extreme food faddists during pregnancy, the perinatal period, or later the health visitor and primary care doctor should endeavour to maintain contact with the family and give advice on infant feeding. For this to be acceptable it will need to be flexible, making use of foods that are both nutritionally adequate and accord with the parents' beliefs.

When frank dietary deficiency exists and parents reject treatment legal intervention is necessary. A place of safety

order enables urgent treatment to be initiated; this should be followed by a case conference. In most cases application will need to be made to the juvenile court for a care or supervision order to ensure continuing compliance with the diet and attendance at follow-up for assessment of growth and nutritional state. The order should be maintained until the child is no longer at risk. In the three cases in which we thought a court order necessary, once it had been obtained we were able to negotiate a nutritionally sound, if rather unusual, diet for the children and then allow them to return home knowing that adequate supervision could be maintained.

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Comparison of intravenous and oral high-dose methotrexate in treatment of solid tumours

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Summary and conclusions

An outpatient regimen of oral high-dose methotrexate was studied in 14 patients with solid tumours over 12 months. Detailed pharmacokinetic analysis in five patients showed high oral bioavailability (mean ± SE of mean 87·6 ± 1·5%), indicating that with this regimen oral methotrexate was well absorbed and the first-pass effect low. Oral administration resulted in peak plasma methotrexate concentrations of 8·4 ± 0·5 μmol/l (382 ± 23 μg/100 ml) and was almost as effective as intravenous administration, which achieved peak concentrations of 9·9 ± 0·4 μmol/l (450 ± 18 μg/100 ml). In all 14 patients the clinical response to oral treatment was comparable to that reported to intravenous administration of high-dose methotrexate used in combination with other cytotoxic drugs. The disease-free interval in cases of adult sarcoma was 7·4 ± 1·3 months and the relapse rate 29%. Out of four patients with small-cell carcinoma, two showed an objective response to oral treatment.

We suggest that oral high-dose methotrexate given in divided doses is a rational alternative to expensive intravenous high-dose methotrexate regimens, but further clinical evaluation is necessary.

Introduction

Recent correspondence suggests that substantial disagreement exists about the absorption of high oral doses of methotrexate.[1-4] It has been reported that although small oral doses of methotrexate are well absorbed, larger doses (above 80 mg/m²) are poorly absorbed and metabolised by the liver.[4-6] This has led to the widespread use of parenteral routes when high-dose methotrexate followed by folinic-acid "rescue" is used to treat various solid malignant tumours.[7-9] Intravenous treatment has the dual disadvantage of needing to be carried out on an inpatient basis and substantially increasing the costs of drug treatment. Bell *et al*[3] recommended a modified oral high-dose (400 mg) methotrexate regimen with folinic-acid rescue for treating solid tumours. In the past 12 months we have used a similar method of administering high-dose (800 mg) methotrexate by mouth followed by folinic-acid rescue, which so far has given a clinical response rate comparable to that of high-dose intravenous treatment. We report here our results.

Patients and methods

Patients—We treated 14 patients with the proposed dose schedule. They comprised 12 men and two women with a mean (± SE of mean) age of 44·4 ± 5·0 years, body weight 68·2 ± 3·1 kg, and body surface area 1·8 ± 0·05 m². Ten patients had adult sarcomas, three of which were at an advanced stage with metastases, and in seven the disease was localised and treated initially with surgery or radiotherapy or both. In these seven patients chemotherapy was an adjuvant to prior local treatment. The remaining four patients had inoperable small-cell carcinoma of the lung.

Chemotherapy—A course of chemotherapy consisted of 800 mg of methotrexate given in combination with cyclophosphamide (250 mg/m²), adriamycin (1 mg/kg), and vincristine (1 mg/m²), and was given at four-week intervals. Methotrexate was given on day 1 of each course, followed on day 2 by the rest of the combination therapy. Peripheral white cell and platelet counts and renal and liver function tests were performed before each treatment and repeated on days 3 and 10 of each course. On the first occasion methotrexate was given intravenously as a continuous infusion over 16 hours. Subsequently the same dose of methotrexate was given by mouth (50 mg each hour for 16 hours) on an outpatient basis. Eight hours after completing the methotrexate administration folinic acid (Leucovorin) was started in a dose of 15 mg by mouth four times daily and 6 mg intramuscularly daily for two days. Cyclophosphamide, vincristine, and adriamycin were given intravenously in the outpatient clinic on day 2.

Pharmacokinetic studies—We studied five patients with normal creatinine clearances. Plasma samples were collected via an indwelling intravenous catheter and stored at −20°C until assayed for methotrexate. Sampling times were 15 minutes before the dose and then at two-hour intervals for the first 20 hours and at four- to 12-hour

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